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Claims

[c1] 1. A semiconductor wafer having an active surface, the wafer comprising:

a multiplicity of dice, each die having a plurality of contact pads formed on the active surface of the wafer;

a plurality of solder bumps, wherein at least a portion of said plurality of solder bumps are each coupled with an associated contact pad; and

a support coating formed on the active surface of the wafer, wherein the support coating is sufficiently rigid such that it can significantly constrain portions of the solder bumps near the contact pads during a subsequent reflow of any of said plurality of solder bumps.

[c2] 2. A semiconductor wafer as recited in claim 1, wherein said support coating is applied to the active surface such that the underlying contact pads, under bump metallizations, and active surface are all substantially covered by the support coating.

[c3] 3. A semiconductor wafer as recited in claim 1, wherein the height of said support coating is in the range of

about 20 to 70 percent of the pre-reflow height of said solder bumps.

[c4] 4. A semiconductor wafer as recited in claim 3, wherein the height of said support coating is about 50 percent of the pre-reflow height of said solder bumps.

[c5] 5. A semiconductor wafer as recited in claim 1, wherein the junction between the solder bumps and their associated contact pads define wetting angles that are at least approximately 40 degrees.

[c6] 6. A semiconductor wafer as recited in claim 1, wherein the support coating is formed from an epoxy based material.

[c7] 7. A semiconductor wafer as recited in claim 6 wherein the epoxy based material that forms the support coating is substantially fully cured.

[c8] 8. An integrated circuit device, comprising:

a die having an active surface;

a plurality of solder bumps formed on the active surface of said die; and

a support coating formed on said active surface of said die, wherein said support coating has been fully cured prior to any reflow of any of said plurality of solder bumps.

[c9] 9. The integrated circuit device of claim 8, wherein said support coating is formed from an epoxy based material.

[c10] 10. The integrated circuit device of claim 8, wherein the height of said support coating is about 20 to 70 percent of the pre-reflow height of said solder bumps.

[c11] 11. The integrated circuit device of claim 10, wherein the height of said support coating is about 40 to 60 percent of the pre-reflow height of said solder bumps.

[c12] 12. The integrated circuit device of claim 8, wherein said support coating is applied to the active surface such that the underlying contact pads, under bump metallizations, and active surface are all substantially covered by the support coating.

[c13] 13. An integrated circuit device, comprising:

a die having an active surface and a plurality of die contact pads formed on the active surface of the die;

a plurality of solder bumps coupled with associated die contact pads; and

a support coating formed on said active surface of said die, wherein said support coating is sufficiently rigid such that it is suitable for significantly constraining portions of the solder bumps near the bump to die interfaces during a subsequent reflow of

said plurality of solder bumps.

[c14] 14. A system comprising:

the integrated circuit device of claim 13; and

a substrate having a plurality of substrate contact pads, wherein said integrated circuit device has been coupled with one or more substrate contact pads to form one or more solder joints, and wherein the junction between at least one of said one or more solder joints and its associated die contact pad defines a wetting angle that is at least approximately 40 degrees.

[c15] 15. The system of claim 14, wherein the offset distance between said die and said substrate is at least 12 mils.

[c16] 16. The system of claim 14, wherein the maximum solder joint width is less than 115 percent of the maximum width of the corresponding solder bump prior to reflow.

[c17] 17. A method of manufacturing at least one integrated circuit device, comprising:

providing a semiconductor wafer;

forming a plurality of contact pads on an active surface of said semiconductor wafer;

forming a plurality of solder bumps on the active surface of said semiconductor wafer;

forming a support coating on the active surface of said semiconductor wafer;

rendering said support coating as sufficiently rigid such that it can significantly constrain portions of said solder bumps near the contact pads during a subsequent reflow of any of said plurality of solder bumps; and

cutting said wafer into a plurality of integrated circuit devices.

[c18] 18. The method of claim 17, wherein said support coating substantially comprises an epoxy or epoxy-like material.

[c19] 19. The method of claim 17, wherein the height of said support coating is in the range of about 20 to 70 percent of the pre-flow height of said solder bumps.

[c20] 20. The method of claim 17, further comprising the steps of:

attaching one of said plurality of integrated circuit devices to an associated substrate such that at least one of said solder bumps contacts said substrate; and

reflowing one or more of said solder bumps contacting said associated printed circuit board to form one or more solder joints connecting said one integrated

circuit device to said associated printed circuit board.